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Specification and Drawings, as originally filed, with Application for Patent Serial No:
2,425,722, on April 17, 2003, by STEVEN M. DONALDSON, for "Portable Ice Rink
Building and Resurfacing Device"

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Mary Buckner
Agent certificateur/Certifying Officer

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ABSTRACT OF THE INVENTION

An ice rink building and resurfacing device that comprises a chassis; a water tank mounted on said chassis; a heating mechanism mounted in heat exchange relation to the water tank; the water tank being adapted to receive snow to be melted; and a fluid dispersing means connected to said tank for distributing a layer of water onto an ice rink surface. This device is well suited for ice rinks in residential areas, in backyards, on various forms of ice surfaces, in remote terrain, and in community parks.

PORTABLE ICE RINK BUILDING AND RESURFACING DEVICE

FIELD OF THE INVENTION

This invention relates to a portable ice rink building and resurfacing device particularly a resurfacing apparatus having a heating mechanism enabling the user to utilize natural snow for distribution of water over the ice surface.

BACKGROUND OF THE INVENTION

This invention relates to a portable ice rink building and resurfacing device.

Due to the popularity of ice rinks based sport events such as competitive skating, hockey games and curling, ice rink resurfacing equipment is well known in the art. The most popular ice rink resurfacing equipment is likely that sold under the trademark Zamboni, originally disclosed in US Pat. No. 2,642,679, and later improved and refined and described for example by U.S. Pat. Nos. 3,622,205, 4,705,320, 4,372,617, 4,356,584, 4,125,915, 4,084,763, and 4,069,540, all issued to Zamboni. The self-propelled Zamboni ice rink resurfacing machines and other similar machines (such as those sold under the Olympia trademark, and other machines represented by US. Pat. Nos. 5,133,139 and 2,795,870) are based on the principle of shaving the surface of the ice, scraping the ice surface to remove ice shavings accumulated from skating and reapplying a smooth and thin layer of water which fills skate grooves and crevices and freezes to provide a smooth ice surface.

These large machines usually are the size of a car, as exemplified by the first model of the Zamboni which was built on the chassis of a military surplus jeep. Due to their initial high capital cost and their inability to create de

novo an ice rink, these large machines are suitable for large indoor ice rinks in commercial and non-commercial sports centers only. They are not designed for use in resurfacing remote rinks, outdoor skating ponds and backyard ice surfaces which are common in cold climates. To satisfy this market segment of ice rink resurfacing devices, several portable and non-self propelled resurfacing machines have been proposed to resurface smaller indoor rinks, outdoor skating ponds, neighborhood parks and remote ice rinks.

One class of such devices comprises hand-held manual ice resurfacers, as described in the US. Pat. No. 5,771,698 and CA 2,178,966. Although both devices have different shapes, they both have a long handle for applying drag or push actions in order to resurface the ice rink. More importantly, both rely on an external water supply through a water hose to complete the resurfacing job. This limitation severely restricts the use of the devices to places near a water tap. Furthermore, in severely cold weather such as often happens in Canada and northern United States, the water hose can easily freeze. Draining and lugging water hoses is very cumbersome and the hoses must also be stored in a heated environment to prevent freezing.

Another class of devices tries to reduce this water supply dependency by incorporating a water tank on board. Two examples are illustrated in US. Pat. No. 6,138,387 and the Olympia Flood Cart advertised by Resurface Corp. (www.resurface.com). These designs, while alleviating the problems of external water dependency and water freezing at low temperature, do not solve the problems completely. That is, an external water source is still needed in proximity to the ice rink. Water can still freeze inside the water tank. The transporting of large quantities of water over a distance or over awkward terrain is a task particularly hard to do in hardy winter conditions. It is all the more frustrating if the water freezes at the destination before application. Moreover, the quality of an ice rink surface made using cold water is inferior compared to one made with warm water.

SUMMARY OF THE INVENTION

An object of the present invention is to provide an improved portable ice rink building and resurfacing device which alleviates the above noted problems associated with the prior art device.

In accordance with one aspect of the present invention there is provided a chassis; a water tank mounted on said chassis; a heating mechanism mounted in heat exchange relation to the water tank; the water tank being adapted to receive snow to be melted; and a fluid dispersing means connected to said tank for distributing a layer of water onto an ice rink surface.

The chassis of the ice rink building and resurfacing device has conveniently a long flat-bottomed sled form with one curved up end commonly known as toboggan. In a preferred embodiment the water tank has a heat exchange chamber in the middle, the heating mechanism uses combustible fuel material and resides in the heating chamber in the middle of the water tank. It is preferred to have wheels mounted on the chassis as moving means; Preferably the platform of the chassis is lower than the axis of the wheels.

The foregoing objects and advantages of the present invention will become apparent to those skilled in the art to which this invention relates as this specification proceeds. The invention is herein described by reference to the accompanying illustrative embodiment forming a part hereof, which includes a description of the best mode known to the applicant and wherein like reference numbers refer to like parts throughout the several views, in which:

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a longitudinal vertical cross-sectional view of a preferred embodiment of the ice rink resurfacing device according to the present invention;

FIG. 2 is a cross-sectional view in top profile of the ice rink resurfacing device;

FIG. 3 is a front view of the ice rink resurfacing device;

FIG. 4 is a longitudinal vertical cross-sectional view of the ice rink resurfacing device during the storage.

DETAILED DESCRIPTION OF THE INVENTION

The preferred embodiment of ice rink resurfacing device as shown in the drawings comprises chassis 100 defined by a substantially flat rectangular plate 102 having an upturned curved flange 105 at the front of the device so that the chassis 100 as a whole has the shape of a toboggan. The flange 105 has an extended portion 104 at the front of the chassis. A swivel or castor wheel 110 is mounted to the extended chassis portion 104 at the front of the device. A rigid, square box-like cabinet 115 is mounted on the chassis 100.

Referring to Figs. 1-3 a transverse axle 195 for rear support wheels 150 and a rearward fuel tank 140 are fixed to the rear face of cabinet 115. The rear wheels 150 are attached at the distal ends of the axle 195. The chassis plate 102 is mounted lower than the axle 195 for the rear wheels 150 and the axle 111 for the front castor wheel 110 such that the bottom of the chassis plate 102 preferably has a clearance of about 1 ½ inch above the ice surface. When in use this design has the advantage of allowing the device to be rolled along on its wheels when on solid ice surface, and dragged as a

toboggan when on snow beyond the ice surface thus facilitating transport both toward and away from an outdoor rink.

Three sockets 210 are welded to the upper extremities of the cabinet in spaced apart relation to each other. An elongated horizontal F-shaped handle 225 is removably inserted into adjacent pair of the three sockets 210. This arrangement allows both left-handed and right-handed users to drag or push the device. Referring to Fig. 2 and Fig.3 the F-shaped handle 225 is mounted in a position suitable for left-handed user for the benefit of the left-handed users common in hockey game.

Inside the cabinet 115 is a water tank 175 having a centrally located heating chamber 190 with a pyramid-formed top. A heat exchange mechanism defines a space 107 between water tank 175 and cabinet 115; space 155 between water tank 115 and heat chamber 190. Located inside the heating chamber 190 is a burner 160. The fresh air will enter an opening 106 at the bottom of the cabinet. Gases heated by the burner 160 in heating chamber 190 will rise to the top and exit through apertures 135 located at the top of the heating chamber. The heated gases travel first through the space 155 between the water tank and the heating chamber 190 and then through the space 107 between the water tank and the cabinet 115 thereby to transfer the heat to the fluid inside the water tank 175. The gases will exit at a opening 185. The transfer of the heat takes place inside and outside of the water tank providing high efficiency.

Inside the water tank 175 the snow is melted by the heat conducted through the wall of the water tank. The melted snow will reach the bottom of the water tank 175 by gravity. For easy reception of manually shoveled snow there is a hopper mounted on the top of the water tank. Between the hopper and the water tank 185 there is a filtering device for removing possible large solids from the snow (not shown).

The burner is connected to the fuel tank 140 through a tube (not shown) in connectional fashion. On top of the water tank 175 is a folding

receptacle 130 for receiving the snow brought into the ice rink resurfacing device.

Referring now to Fig. 1 and Fig. 2 there is shown rearwardly extending pipe 280 connecting a water disperser 290 to the bottom of water tank 175. The water disperser 290 is in the form of a hollow telescopic structure which can be adjusted in length to provide the desired water application path width. The water disperser 290 has a plurality of small apertures arranged in a pattern on the bottom side. Connected to the full length of the water disperser is a flexible mat member 145 which contacts the ice surface as shown. The water dispersed by the water disperser 290 is spread evenly over the existing rink surface by the mat member 145 to form a thin layer of ice. A control valve 292 in pipe 280 controls the flow of water from the tank 175 as required.

Referring now to Fig. 4 the ice rink building and resurfacing device is shown in storage. The rear wheels and the front castor are removed. The fuel tank 140 is stored separately. At the junction of upturned curved flange 105 and the extended chassis portion 104 there is a socket 165 which has the same diameter as the sockets 210 on the cabinet for hanging the device on a vertical surface. The elongated handle 225 is inserted into the socket 165.

One advantage of the present invention is that the portable ice rink building and resurfacing device is capable of using natural snow to build the ice rink, thereby eliminating the dependency on a separate water supply. Since no water supply is required, another advantage of the present invention is that the portable ice rink building and resurfacing device can readily create an ice rink at a remote place. Due to the simple construction of the device the present invention provides the economic advantages in use, in manufacture and in maintenance.

The construction of the central located heating chamber provides very efficient heat exchange, has heat exchange surfaces on both internal and external walls of the water tank minimizing the loss of heat, especially in colder climates. The efficient use of the warm water results in a better quality ice rink.

Another advantage of the present invention is that the portable ice rink building and resurfacing device has the chassis and the wheels constructed in an arrangement such that on a solid ice rink, the wheels will provide for ease of movement whereas on a snow covered surface the low clearance of the toboggan-shaped chassis will provide easy movement, enabling the device to be moved readily with relatively little effort in most cases as the wheels will not penetrate far into the snow and impede movement.

WHAT IS CLAIMED IS:

1. A portable ice rink building and resurfacing device, comprising:
 - a chassis;
 - a water tank mounted on said chassis;
 - a heating mechanism mounted in heat exchange relation to the water tank;
 - the water tank being adapted to receive snow to be melted; and
 - a fluid dispersing means connected to said tank for distributing a layer of water onto an ice rink surface.
2. The invention according to claim 1 wherein the chassis comprises a long flat-plate curved up at a forward end to provide a toboggan-like shape to enable skidding of the device over a snow covered surface.
3. The invention according to claim 1 wherein the water tank has a heating chamber in the middle.
4. The invention according to claim 1 wherein a hopper is used to receive natural snow.
5. The invention according to claim 1 wherein there is a filtering device between the hopper and the water tank for removing large solids.
6. The invention according to claim 1 wherein the fluid dispersing means further comprising a fluid dispensing bar, said fluid dispensing bar having plurality of holes for distributing thin layer of water on horizontal surfaces.
7. The invention according to claim 1 wherein the fluid dispersing means further comprising a fluid dispensing bar, said fluid dispensing bar having a telescopic structure.

8. A portable ice rink building and resurfacing device, comprising:

a chassis further comprising a long flat-plate curved up at a forward end to provide a toboggan-like shape to enable skidding of the device over a snow covered surface;

a water tank mounted on said chassis;

a heating mechanism mounted in heat exchange relation to the water tank;

the water tank being adapted to receive snow to be melted; and

a fluid dispersing means connected to said tank for distributing a layer of water onto an ice rink surface.

9. The invention according to claim 8 wherein the bottom of the chassis is located at a height lower than the axles of the wheels.

10. The method of moving the portable ice rink building and resurfacing device according to claim 8 when on ice surface the wheels functions as the means for movement.

11. The method of moving the portable ice rink building and resurfacing device according to claim 8 when on snow the toboggan-formed chassis functions as the means for movement.

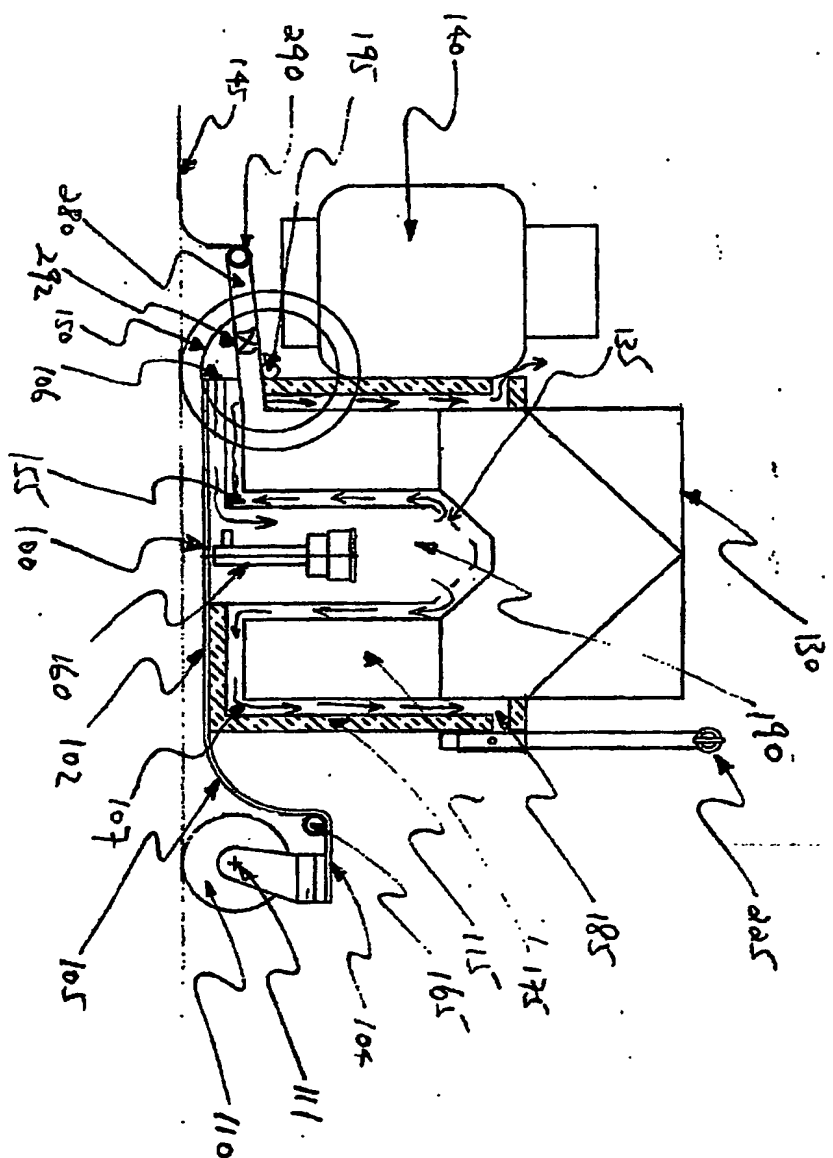


Fig. 1

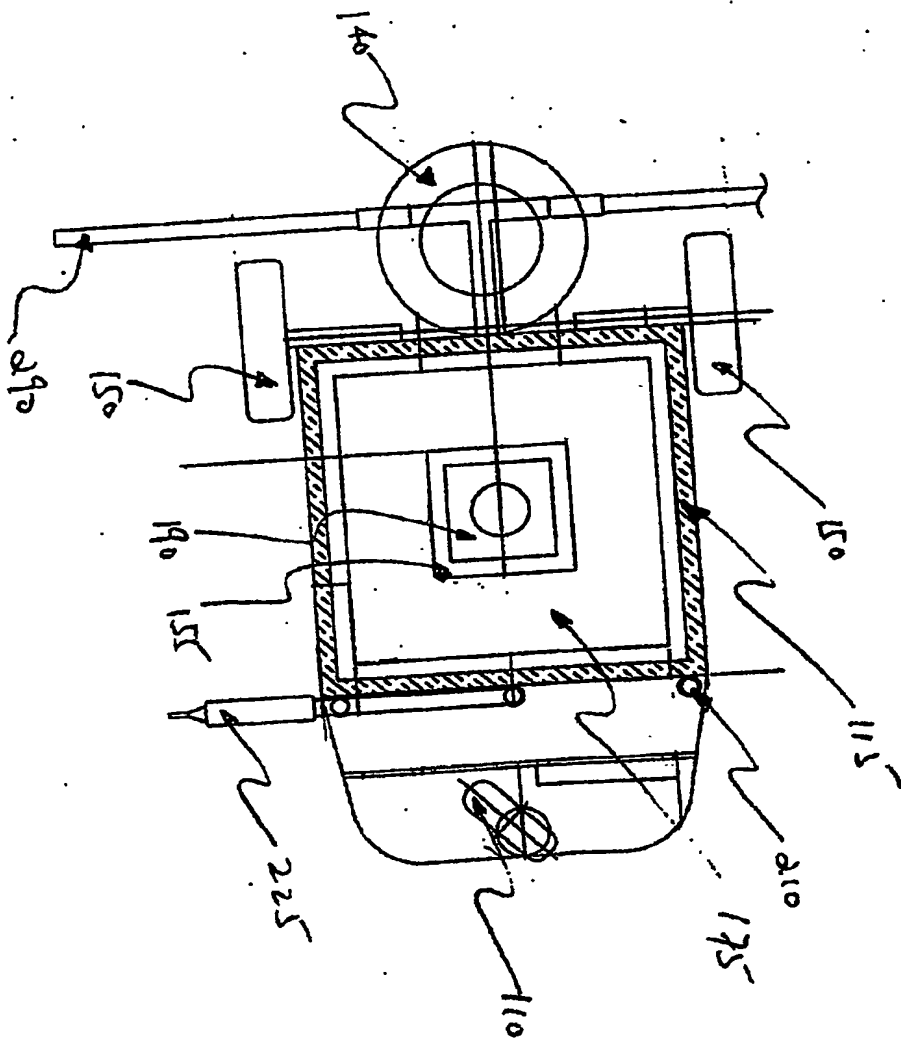


Fig. 2

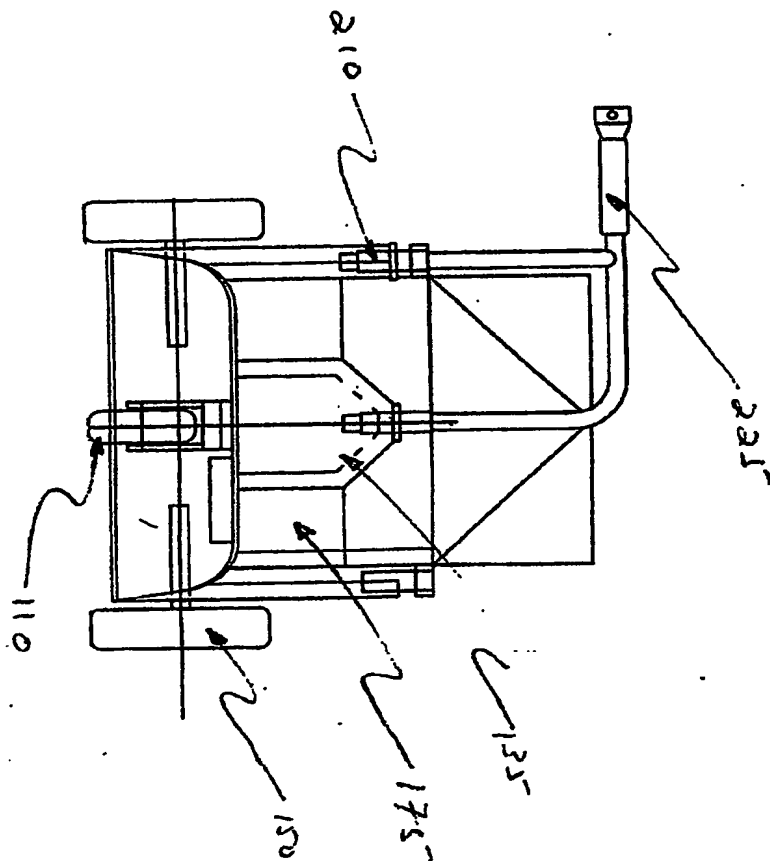


Fig. 3

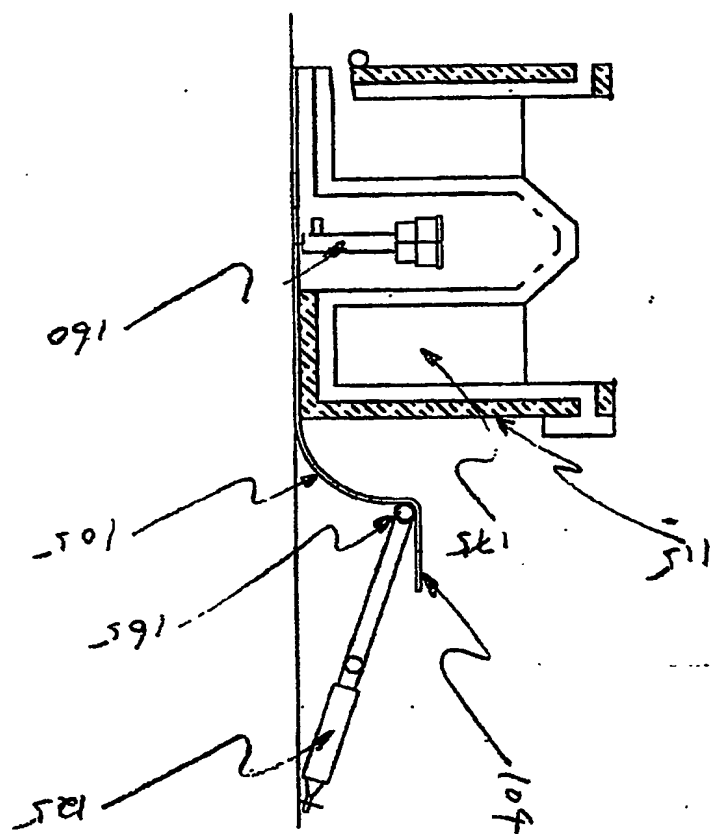


Fig. 4